BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Facilitating the Deployment of Text-to-911 and Other Next Generation 911 Applications	)	**PS Docket No. 11-153**
	)	
Framework for Next Generation 911 Deployment	)	**PS Docket No. 10-255**

COMMENTS OF COMPTEL

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COMMENTS OF COMPTEL

COMPTEL, through counsel, hereby submits its comments in response to the Notice of Proposed Rulemaking ("NPRM") issued in the above-captioned proceedings. COMPTEL supports the Commission's goals of accelerating the development and deployment of Next Generation 911 ("NG911") technology that will enable the public to send emergency communications to 911 Public Safety Answering Points (PSAPs) via text, photos, videos, and data as well as enhancing the information available to PSAPs and first responders for assessing and responding to emergencies. An underlying prerequisite to achieving these goals is direct IP-to-IP interconnection between and among carriers.

In its recent Report and Order adopting changes to its intercarrier compensation and universal service rules, the Commission acknowledged that "IP interconnection between providers is . . . critical" to its objective of promoting the deployment and use of IP networks and that the duty to negotiate in "good faith has been a longstanding element of interconnection requirements under the Communications Act and does not depend

upon the network technology underlying the interconnection, whether TDM, IP, or otherwise."[1] Nonetheless, the Commission declined to identify the specific statutory provisions – whether Section 4, 201, 251(a), 251(c) or 706 of the Act -- that should guide IP-to-IP interconnection negotiations or even to determine whether such interconnection arrangements should be left unregulated and subject to commercial agreements.[2] The Commission's continuing delay in clarifying that Sections 251 and 252 of the Communications Act, 47 U.S.C. §§ 251, 252, govern IP- to- IP interconnection only serves to frustrate realization of the benefits that NG911 is capable of delivering. As Commissioner Copps astutely observed in the context of the Commission's intercarrier compensation and universal service reforms:

> We ought to be long past declaring that IP-to-IP interconnection obligations are required under the Act. We had the chance to do this and to declare that VoIP is a telecommunications service back in 2002 and 2005, and our failures to do so have had tangibly perverse consequences. Avoiding action not only harms competition and delays the more efficient build-out of our information infrastructure – it ensures that America will continue to be down the global broadband rankings in a world where that just doesn't cut it for us.[3]

INTRODUCTION AND SUMMARY

Recognizing the widespread availability and increasing use of text in communications systems and that many of the emerging IP-based mechanisms for delivering text also have the capability to support delivery of photos, videos and other data, the NPRM appropriately asks what role the Commission should play to facilitate

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1 *In the Matter of Connect America Fund,* WC Docket No. 10-90, *et al.*, Report and Order and Further Notice of Proposed Rulemaking, FCC 11-161 (rel. Nov. 18, 2011) at ¶¶1010, 1011.

2 *Id.* at ¶¶1335, 1343.

3 *In the Matter of Connect America Fund,* WC Docket No. 10-90 *et al.,* Statement of Commissioner Michael J. Copps at 6 (rel. Oct. 27, 2011).

and accelerate the implementation of text-capable communications to support NG 911.[4] Each and every advancement contemplated by the Commission in the deployment of NG911 is built upon the premise of using Internet Protocol (IP) as the foundation for all communications. COMPTEL fully supports this presumption. It also submits that the Commission's premise represents yet another example[5] of the need for the Commission to confirm without further delay that carriers are entitled to direct IP-to-IP interconnection pursuant to Sections 251 and 252 of the Act so that they may offer their customers access to managed, advanced NG911services.

There is no question that wireless communications networks provide great advantages in terms of mobility and functionality. Nonetheless, it is predominantly the wireline network that provides the high-speed broadband backhaul capacity and interconnection to the public switched telephone network necessary for the wireless ecosystem to function. Isolated from the nation's wireline broadband networks, wireless networks are not capable of supporting the bandwidth demands of today's users, including the bandwidth necessary to support the multimedia requirements of the NG911. In the interest of promoting the ubiquitous availability of advanced emergency services, the Commission must confirm that all modalities of communication networks, including wireless, wireline and cable systems, have the right to interconnect on an IP-to-IP basis as well as the ability to enforce that right through arbitration if the parties cannot reach a voluntary agreement.

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4 NPRM at ¶¶3-9.

5 A number of the benefits of direct IP-to-IP interconnection pursuant to sections 251 and 252 of the Act, as well as the evolutionary bottlenecks caused by the lack thereof, are discussed in the attached white paper entitled "IP Interconnection for Managed VoIP."

The NPRM explores ways to maximize the use of emerging technology in order to give the public, Public Safety Answering Points ("PSAPs") and emergency responders access to methods of communication and data in a coordinated, real-time fashion in order to facilitate and expedite emergency response.[6] In addition to direct IP-to-IP interconnection, Session Initiation Protocol ("SIP") signaling, which is also reliant upon IP interconnection, is necessary to establish a common control plane functionality to allow such coordinated access.

The Commission also recognizes the advantages of these emerging technologies in supporting advanced emergency communications services for those with disabilities. Services such as real-time text, video and data applications, for example, would not only speed the conveyance of information relating to the scope and scale of an emergency to PSAPs and first responders, but they may also serve as the only means by which a disabled person can convey any information at all to a PSAP. Interconnection of common control plane functionality between carriers, such as that provided by the IP Multimedia Subsystem ("IMS"), is critical to the multimedia session coordination required to support these services. IMS is an architecture standard developed by the 3rd Generation Partnership Project (3GPP) to define network inter-working for multimedia communication.[7]

COMPTEL submits that the most economically efficient way to promote deployment of the NG911 system is to take advantage of the technologies and operational frameworks already standardized to support carrier deployments of multimedia Next Generation Networks (NGNs). The Commission must also take advantage of the

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6 NPRM at ¶¶1-2, 23-24.

7 NPRM at ¶29.

extensive findings and rich body of work produced by the National Emergency Number Association (NENA), the National E9-1-1 Implementation Coordination Office (ICO), the National Telecommunications and Information Administration (NTIA) and the U.S. Department of Transportation (USDOT), the 3GPP, the Alliance of Telecommunications Industry Solutions (ATIS), the European Telecommunications Standards Institute (ETSI), the GSM Administration (GSMA), the Internet Engineering Task Force (IETF), the International Telecommunications Union (ITU) and others that have studied global emergency response system requirements and deployments of multimedia services for much of the past decade. A fundamental operational prerequisite to all of the systems studied and analyzed by these organization is quality of service enabled, direct IP-to-IP interconnection between network providers.

The Commission asks whether there are any legal or regulatory barriers that could hinder deployment of NG911 networks and whether any statutory or regulatory changes would be necessary for the Commission and states to facilitate and oversee the deployment of NG911 networks.[8] The most important action the Commission can take to facilitate the deployment of NG911 networks is to promote the widespread deployment IP-to- IP interconnection to ensure that all carriers can provide the uniform network capabilities, capacity and performance required by the advanced services contemplated for the NG911. An affirmative reiteration that the Communications Act is technology neutral and that the Section 251/252 interconnection and arbitration obligations govern IP-to-IP interconnection arrangements just as they do circuit-switched interconnection arrangements will go a long way toward removing the resistance that competitive carriers

[8] NPRM at ¶¶9, 16, 96-100.

have encountered when requesting to interconnect on an IP-to-IP basis with certain incumbent local exchange carriers. COMPTEL urges the Commission to expeditiously direct incumbent LECs to comply with the obligations imposed by Section 251(c) of the Act and negotiate IP-to-IP interconnection agreements with requesting carriers in good faith and if negotiations fail to produce an agreement, arbitrate any differences before the State Commission as required by Section 252.

I. QoS-enabled, Direct IP-to-IP Interconnection Is Crucial To Wireless Network Backhaul For NG911 Services

Wireless networks are evolving to embrace a more intelligent core, where many of the decisions regarding security policy, bandwidth allocation, performance, priority, advanced feature/function availability, reach, consolidation, aggregation and interconnectivity for multimedia communications are made. These decisions are made by specialized devices serving very specific roles. For example, devices hosting such functions as Serving, Proxy and Interrogating Call Session Control Function, Home Subscriber Server, Policy and Charging Control Function, Media Resource Function Control and others comprise what is termed the IMS. The IMS serves the *application* of multimedia communication sessions (calls) between calling and called parties. Other components issue and act upon instructions to the Radio Access Network (RAN) and transport network based on those decisions. These include devices such as the Mobility Management Entity (MME), Serving Gateway (SGW), PDN Gateway (PGW), Access Network Discovery and Selection Function (ANDSF) and others, together forming what is called the Evolved Packet Core (EPC).

The signaling framework used to issue and receive instructions between devices within the EPC, and within and between those devices, systems (such as IMS) and carriers interconnecting to the EPC is collectively referred to as the "control plane." Signaling protocols such as Session Initiation Protocol (SIP) and Diameter, among others, are higher-level IP-based protocols used in the control plane of IMS and EPC. The bearer framework within which actual user information, such as a voice conversation, video clip, text message or other media is transported, is defined as the "user plane."

Without exception, all of these devices and systems rely upon wireline networks to achieve interconnection with each other, carriers and the multiple devices that comprise the RAN interfaces to wireless subscribers[9]. The tremendous growth in mobile data usage has accelerated and intensified the need for wireline backhaul of both the user plane and control plane traffic in order to offload the RAN at the earliest point possible, thus preserving valuable RF spectrum for subscriber access traffic as much as possible.

A wireless carrier in today's market uses its RF spectrum, almost exclusively, to provide last-mile access to its subscribers. For all other transport, the evolved wireless carrier uses a combination of wireline and some wireless backhaul facilities in order to provide its core service of mobile voice communication. Further, the evolved wireless provider is building an aggregation network comprising microcells and picocells in order to gain extended airside coverage, more efficient spectrum usage and greater airside bandwidth. Each of these aggregation devices represents a need for backhaul facilities and wireless network off-load. Even the access portion of a wireless provider's network,

[9] For example, the Radio Network Controller and NodeB elements of a 3G network or the eNodeB of a 4G/LTE network.

is not entirely comprised of wireless technologies. A femtocell is a small wireless base station that extends the cellular network indoors. It provides the airside interface to subscriber devices, such as smartphones, and connects to the wireless carrier using the subscriber's broadband connection, which is almost always a wireline connection. Therefore, the only wireless portion of the access facility in such cases is the in-building connection between the subscriber device and the femtocell. The connection from the base station to the wireless carrier is almost exclusively made using the subscriber's wireline broadband provider's network.

Today's wireless networks are inextricably linked and increasingly dependent upon wireline networks. The evolution of mobile voice services to VoIP, the explosion of mobile data usage and the introduction of native IP network architectures such as IMS and EPC have accelerated this dependence and increased the complexity of carrier interconnection well beyond the legacy requirements for simple connectivity. The TDM-based carrier-to-carrier interconnections of yesteryear must evolve if they are to support the demand for real-time, interoperable advanced multimedia communications such as those contemplated for NG911. In addition to supporting the bandwidth demands of the user plane, network providers now need standardized interconnections that also provide for the intelligence of the control plane to be dynamically extended through the interconnection between those providers so that these advanced services can maintain operational integrity and guaranteed performance on an end-to-end basis. Without application-aware IP-to-IP interconnection, the assured performance and availability of advanced services such as those contemplated in a NG911 emergency response system

are simply not possible where both (or all) parties to a session (call) are not resident on a single provider's network.

II. QoS-enabled, Direct IP-to-IP Interconnection Is Crucial To The Coordination Of Information Flows For NG911 PSAPs And First Responders

Today, end users gain access to the 911/E911 emergency response system through their voice services provider. That provider may use information from external databases to determine: the location of the caller; [10] the potential need for assistive services;[11]; the responsible public safety answering point ("PSAP");[12] and the call route to the appropriate PSAP or assistive service center. In the legacy world, this framework has served to provide basic voice communications connectivity to the nation's emergency response systems at a very high grade of service and availability.

As the emergency response system evolves to a next generation environment so too must the capabilities and functionality of each provider network necessary to convey and coordinate the flow of multimedia information between all communication service provider networks and public safety agencies. The National Emergency Number Association ("NENA") has worked with the industry for several years to develop an architectural standard -- the NENA i3 Solution -- that determines, articulates and otherwise provides guidance regarding what specific functions, capabilities and interfaces will be required to support a NG911 emergency response system in its most advanced "end state" form.

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[10] For example, carriers may access the ALI or MSAG databases to determine caller location.

[11] For example, Telecommunications Relay Service.

[12] For example, the selective router function.

The NENA i3 Solution introduces the concept of an Emergency Services IP Network (ESInet), which is envisioned as "an IP-based inter-network (network of networks) that can be shared by all public safety agencies that may be involved in any emergency." NENA's "Detailed Functional and Interface Standards for the NENA i3 Solution" document outlines the many ways in which service provider networks must work with the IP-based, expanded functionality of the ESInet. IP-to-IP interconnection is defined for elements of the i3 Solution including its Border Control Function (BCF), Location Validation Function (LVF), Emergency Call Routing Function (ECRF), Emergency Services Routing Proxy (ESRP) and its Legacy Network Gateway to support end users as well as the content, application and assistive services providers that may use the provider's network to interconnect to the ESInet.

The NENA i3 Solution also describes a very specific redundant and resilient connectivity requirement which stipulates

> that the PSAP have at least two entirely different physical connections, which use diverse facilities. For example, an ideal arrangement would be to have the PSAP directly connected to a SONET ring, and to also have an independent fiber or other high bandwidth connection to an entirely separate network with no facilities shared between the SONET ring and the backup facility; for example, a fiber connection from the local cable company or a government owned multimegabit microwave system.[13]

These requirements alone demonstrate the need for direct IP-to-IP interconnection between all service providers in order to ensure that the end state i3 Solution may be made available to all subscribers and that public safety agencies are afforded maximum access connectivity to, from and between other public agencies, including PSAPs, and

[13] See NENA 08-751 "i3 Technical Requirements Document", Appendix A - Recommendations for designing Emergency Services IP Networks, Network.0900-0100.

third party providers of database and application services which may augment the public safety agency's ability to respond to an emergency event.

The NENA i3 Solution further stipulates internetworking support for "voice, video and text media streams on RTP transport" and additionally requires that "[a] minimal (*e.g.* DiffServe) QoS mechanism shall be specified for use for media presented to or originated from the PSAP."[14] With support for these media characteristics mandated as fundamental requirements of the i3 Solution, it would be impossible to implement the i3 Solution itself without application-aware, QoS-enabled, direct IP-to-IP interconnection between participating service providers.

The i3 Solution acknowledges the advanced capabilities of the 3GPP's IMS framework and is designed to support ESInet inter-working with the formidable multimedia functionality of the IMS architecture. This expanded signaling capability allows for the flow-through of critical instructions necessary to coordinate real-time information flows from multiple sources to the responsible PSAPs, first responders or other public agencies that may be involved in any given emergency.

IMS provides a level of operational functionality not achievable in basic IP-based and SIP-signaled environments. It provides network-level intelligence capable of fully supporting and coordinating the multimedia, multi-participant requirements of a NG911 emergency response system. The IMS design has been augmented by the 3GPP to anticipate and coincide with the functional requirements and interconnection interfaces

[14] See NENA 08-751 "i3 Technical Requirements Document," Section 4 - Functional Requirements, Media 0600-0100.

outlined in the NENA i3 Solution.[15] The Alliance for Telecommunications Industry Solutions (ATIS) is one of the six 3GPP Organizational Partners (OP) and the sole North American OP. In its April 29, 2011 *Ex Parte*, filed in this proceeding, ATIS discloses that the 3GPP Non-Voice Emergency Services (NOVES) are based on the requirements developed by NENA and are intended for use "within any IMS-based network."[16]

The IMS framework has been embraced by network service providers using all technologies to provide service, including wireless, wireline and cable operators, as essential to next-generation network evolution and world wide interoperability among and between those providers. 3GPP, CableLABS, ETSI, GSMA, IEEE, IETF, ITU-T and others have all moved to adopt the initial core development work initiated by the 3GPP and to collaborate with each other to request and/or modify and adopt the existing and emerging standards of each respective organization in areas where the organization possesses a particular proficiency. This cooperative effort to deploy an IMS-enabled next generation network has resulted in the potential for QoS-aware, end-to-end service continuity across providers – exactly the environment needed to support the NENA i3 solution of NG911.

The availability, selection and coordination of multiple information flows between multiple participants and end-points in a quality-controlled environment is crucial to the success of NG911. In an effort to promote the availability of full service provider network interoperability required to support NG911, the Commission must

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15 *See* 3GPP technical specification TS 23.167 entitled "IP Multimedia Subsystem (IMS) emergency sessions (Release 11)."

16 *See* April 29, 2011 Letter from Thomas Goode, General Counsel, Alliance For Telecommunications Industry Solutions ("ATIS") to Marlene Dortch filed in PS Docket No. 10-255.

make clear that IP-to-IP interconnection agreements are governed by Sections 251 and 252 and that incumbent LECs are obligated to negotiate in good faith interconnection agreements that subsume standardized interfaces, connection points and quality of service and to submit to arbitration if unable to agree.

III. QoS-enabled, Direct IP-to-IP Interconnection Is Crucial To All Published Designs Of Tomorrow's Emergency Response Systems As Defined by Global Standards Organizations, Governmental And Industry Stakeholders

Stakeholders around the world have been anticipating migration to a native IP-based platform for emergency response networks and systems for more than 10 years. In the U.S., NENA Technical Committee leaders began discussions about future 911 needs and concepts to support them as early as the year 2000.[17] USDOT defined a preliminary "Concept of Operations" for NG911 more than six years ago.[18] More recently, in 2009, the ICO published "A National Plan for Migrating to IP-Enabled 9-1-1 Systems" in response to a directive from Congress "to develop 'a national plan for migrating to a national [Internet Protocol] IP-enabled emergency network capable of receiving and responding to all citizen-activated emergency communications and improving information sharing among emergency response entities.'"[19] ICO has recommended that Federal and State authorities "ensure that rules and regulations governing the transition from the legacy system to IP-enabled 9-1-1 are neutral in all respects, including issues

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[17] *See* NENA NG9-1-1 Project History, available at http://www.nena.org/resource/resmgr/ng9-1-1_project/ng9-1-1_history.pdf

[18] *See* U.S. Department of Transportation preliminary "Concept of Operations", December 2005, available at http://www.its.dot.gov/ng911/pdf/ConOps.pdf.

[19] *See* The National E9-1-1 Implementation Coordination Office, "A National Plan For Migrating to IP-Enabled 9-1-1 Systems" at 1-1 (Sept. 2009).

such as technology platforms, interconnection, system pricing, funding mechanisms and certification."[20]

In the comparable initiatives of other global standards organizations. such as those mentioned above, designs began to emerge during the early 2000s to leverage the work already completed, and the considerable work underway, to support a service provider's evolution to an IP-based next generation network for all products and services. These efforts led to global collaboration, resulting in the potential for IMS-based, world-wide emergency response interconnectivity.

ATIS has undertaken the responsibility to ensure that the 3GPP standards, including IMS, "…meet the market and regulatory needs and/or to add the necessary specificity to these standards to make them implementable in North America."."[21] The ITU benefits from ATIS membership and the substantial work in this area and is in conformance with requirements for emergency services that specify the use of IMS-based technologies where applicable.

Similarly, CableLabs has announced NENA conformance for emergency services using the 3GPP IMS-enabled emergency network topologies in its PacketCable™ Residential SIP Telephony Feature Specification: "Given the scope of PacketCable, the on-going work in 3GPP IMS on emergency services, and the importance of E-911 support in VoIP networks, the applicability of the NENA i1, pre-i2, i2, and i3 interim phases for North America is assumed."

With a growing global focus on IP-based emergency services definition and standardization, an initiative was undertaken by the National 911 Program to document

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20 *Id*. at 5-12.

21 *See* ATIS April 29, 2011 *Ex Parte* filed in PS Docket No. 10-255.

and then follow the efforts of the multiple standards bodies with ongoing projects to define standards in support of NG911. The initiative resulted in a paper entitled "A compilation of existing and planned standards for NG911 systems" which was just published on September 21, 2011. This document identifies no less than thirty-three "Standards and Best Practices Organizations." Without exception, all of the named participants have published specifications requiring the QoS-enabled, direct IP-to-IP interconnection between service providers that facilitates IMS-based emergency response interoperability on both the control plane (signaling) and the user plane (media).[22]

IV. QoS-enabled, Direct IP-to-IP Interconnection Is Crucial To The Economically Efficient Deployment Of NG911.

Virtually all service providers are in the process of moving to an all-IP network architecture. Until the transition is complete, carriers must continue to bear the cost of legacy interconnections and the conversion of IP traffic to TDM. As providers replace their legacy voice systems with interconnected VoIP, a media gateway, used to transcode the control plane and user plane traffic from its native RTP/SIP IP form to TDM/SS7, must be deployed at the point of interconnection (POI) between the end user's serving carrier and the interconnected carrier. The media gateway receives the packets of signaling and media over a physical interface to the home IP network, transcodes the information to TDM and passes it over physical TDM ports to the interconnected carrier. This functionality is only needed where QoS-enabled, direct IP-to-IP interconnection between the two network providers is not available. Where such interconnection is

[22] All have adopted the NENA i3Solution for end state NG911 which contains these requirements in NENA 08-751 "i3 Technical Requirements Document" available at http://www.nena9-1-1.org/sites/default/files/08-751_20060928.pdf

available, carriers will be able to avoid the capital and operating costs of the media gateway functionality.

The costs of deploying media gateways can be significant if the physical location of the POIs between the two network providers remains the same as that which was used for TDM/SS7 voice interconnection because the number of media gateways that must be purchased and maintained would need to reflect the topology and economic inefficiency of the legacy interconnection framework. The serving network provider, in such a case, would incur either the capital cost (along with the operational cost) of deployment for each device at each and every point of legacy interconnection, or the capital and operational costs of new facilities necessary to backhaul the TDM/SS7 traffic to an aggregation point where a media gateway function device is deployed. In either case the serving carrier would incur the cost inefficiencies of the legacy network and, therefore, surrender the economic benefits of an IP-based network for such traffic.

In addition to these direct costs the service provider would also forego potential revenue from services associated with the advanced functionality inherent in IP-based services for any traffic passing through such a media gateway. Since the IP control plane information cannot be passed through the POI, no instructions can be given to direct the interconnected network in the requirements of advanced IP-based services.

CONCLUSION

For the foregoing reasons, COMPTEL urges the Commission to confirm without further delay that IP-to-IP interconnection is required pursuant to Section 251 of the Act and that carriers that are unable to reach agreement are entitled to request that a State Commission arbitrate any differences pursuant to Section 252 of the Act, The

Commission's continuing inaction in clarifying carriers' interconnection rights as technology evolves will impede rather than facilitate the deployment of NG911 technology and will delay inexcusably the improvements in emergency response made possible by NG911.

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Respectfully submitted,

/s/

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